CLAIMS

What is claimed is:

- 1. A method for detecting a single nucleotide polymorphism in a target DNA, comprising the steps of:
- (a) conducting a primer extension reaction with components including (1) the target DNA, (2) labeled dideoxynucleotides, and (3) an oligonucleotide primer having a sequence hybridizable to the target DNA, so that a 3' end of the oligonucleotide primer terminates at a last nucleotide before a single nucleotide polymorphism, whereby an extended primer is produced including a 3' end having a labeled dideoxynucleotide corresponding to the single nucleotide polymorphism in the target DNA;
- (b) hybridizing the extended primer to one or more oligonucleotides immobilized on a solid support in the form of an immobilization pattern, whereby a hybridization pattern is produced; and
- (c) detecting the presence or absence of hybridized extended primer in the hybridization pattern.
- 2. The method of claim 1, wherein said primer extension reaction is a multiplex primer extension reaction.
- 3. The method of claim 1, further including the step, before step (a), of identifying a single nucleotide polymorphism of interest in the target DNA.
- 4. The method of claim 3, wherein one or more of said single nucleotide polymorphisms are associated with drug resistance.

- 5. The method of claim 1, wherein one or more of said single nucleotide polymorphisms are located in genes coding for target enzymes of a drug or for transporters associated with drug influx or efflux.
- 6. The method of claim 1, wherein said oligonucleotide primer has a length between 20 and 40 base pairs.
- 7. The method of claim 1, further comprising the steps, before step (a), of: amplifying the target DNA using sequence-specific primers in a polymerase chain reaction, whereby a product is produced comprising the original target DNA and additional target DNA; and treating the additional target DNA with alkaline phosphatase.
- 8. The method of claim 7, wherein said polymerase chain reaction is a multiplex polymerase chain reaction.
- 9. The method of claim 7, wherein the polymerase chain reaction is an <u>in situ</u> polymerase chain reaction.
 - 10. The method of claim 1, wherein said target DNA is from a microorganism.
 - 11. The method of claim 10, wherein said microorganism is a pathogen.
 - 12. The method of claim 11, wherein said pathogen is of a taxon Apicomplexa.
 - 13. The method of claim 12, wherein said pathogen is of the genus Plasmodium.
- 14. The method of claim 13, wherein said pathogen is of the species Plasmodium falciparum.
- 15. The method of claim 14, wherein said single nucleotide polymorphism is located in a Plasmodium falciparum gene selected from the group consisting of pfmdr-1, pfcrt, pfdhfr, pfdhps, pftctp, and the Cytochrome-B gene.

- 16. The methods of claim 1, wherein said dideoxynucleotides are fluorochrome labeled.
- 17. The method of claim 16, wherein said dideoxynucleotides comprise a plurality of species, each species being labeled with a different fluorochrome.
- 18. The method of claim 17, wherein said detecting step comprises detecting hybridized extended primers with a multi-laser scanner.
- 19. The method of claim 1, wherein said detecting step includes detecting the presence or absence of at least about 2 single nucleotide polymorphisms of the target DNA.
- 20. The method of claim 1, wherein said detecting step includes detecting the presence or absence of at least about 10 single nucleotide polymorphisms of the target DNA.
- 21. The method of claim 1, wherein said detecting step includes detecting the presence or absence of at least about 25 single nucleotide polymorphisms of the target DNA.
- 22. The method of claim 1, wherein said detecting step includes detecting the presence or absence of at least about 50 single nucleotide polymorphisms of the target DNA.
- 23. The method of claim 1, wherein said immobilized oligonucleotides are immobilized in a microarray.
- 24. The method of claim 23, wherein said microarray consists of an aldehyde slide and said immobilized oligonucleotides are bound to the aldehyde slide with a C6 amino linker.
- 25. The method of claim 1, wherein said detecting step comprises detecting a fluorochomic quality or color of said hybridized extended primer.
 - 26. A method for drug resistance testing in malaria, comprising the steps of:
 - (a) identifying a single nucleotide polymorphism related to drug resistance in malaria;

- (b) conducting a primer extension reaction with components including (1) the target DNA, (2) labeled dideoxynucleotides, and (3) an oligonucleotide primer having a sequence hybridizable to the target DNA, so that a 3' end of the oligonucleotide primer terminates at a last nucleotide before a single nucleotide polymorphism, whereby an extended primer is produced including a 3' end having a labeled dideoxynucleotide corresponding to the single nucleotide polymorphism in the target DNA;
- (c) hybridizing the extended primer to one or more oligonucleotides immobilized on a solid support in the form of an immobilization pattern, whereby a hybridization pattern is produced; and
- (d) detecting the presence or absence of hybridized extended primer in the hybridization pattern.
- 27. A method for diagnostic or pharmacogenetic analysis of single nucleotide polymorphisms in a target DNA, comprising the steps of:
- (a) identifying a single nucleotide polymorphism of interest for diagnostic or pharmacogenetic analysis;
- (b) conducting a primer extension reaction with components including (1) the target DNA, (2) labeled dideoxynucleotides, and (3) an oligonucleotide primer having a sequence hybridizable to the target DNA, so that a 3' end of the oligonucleotide primer terminates at a last nucleotide before a single nucleotide polymorphism, whereby an extended primer is produced including a 3' end having a labeled dideoxynucleotide corresponding to the single nucleotide polymorphism in the target DNA;

- (c) hybridizing the extended primer to one or more oligonucleotides immobilized on a solid support in the form of an immobilization pattern, whereby a hybridization pattern is produced; and
- (d) detecting the presence or absence of hybridized extended primer in the hybridization pattern.
- 28. An apparatus for analysis of single nucleotides polymorphisms in target DNA, comprising:

a multiprocedure station having a sealable interior able to hold one or more microarrays,

a source of one or more oligonucleotide primers to be added the to microarrays, the primers having labeled 3' ends corresponding to one or more single nucleotide polymorphisms, and

a heating or cooling unit arranged to heat and/or cool the microarrays.

- 29. The apparatus of claim 28, further comprising: a washing assembly arranged to wash the microarrays, and a drying assembly arranged to dry the microarrays.
- 30. The apparatus of claim 28, further comprising:

an automated pipetting robot including a xyz-robot arm, an active dispenser, and a wash station arranged to wash the active dispenser, the robot arranged to transfer said primers to said microarrays.